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JOINT MEETING WITH THE BRITISH ECOLOGICAL SOCIETY

FRIDAY, 12TH NOVEMBER, 1943, **at 2.30 p.m.**

at

41, Queen's Gate, South Kensington, London, S.W. 7.

The interrelations of plants and insects: the place of both in the eco-system.

The following have agreed to speak :—

1. Prof. E. J. Salisbury, F.R.S.

The insect-flower relations have been extensively studied but the quantitative aspects of insect-pollination have been little explored though economically important, whilst the competition aspect has been largely ignored. The balance between the good and the harm done by one species of insect may be nearly even, as for example by the Yucca-moth.

Food preferences of plant-eating insects raise many further problems in behaviour and physiology while the control of their activities is an important factor in successful agriculture, as exemplified by insect-carried plant viruses.

Just as the British Flora has an evolutionary history since preglacial times, so too has the interrelation between the flora and its insect parasites. This interrelation has as yet hardly been considered at all in its historic aspects.

2. Dr. E. A. Cockayne, M.A., F.R.C.P.

Species of Macrolepidoptera limited by special plant-species.

Specialisation appears to be greater in the Microlepidoptera than in the Macrolepidoptera. Many of the latter are attached to a genus rather than to a species, and others eat two or three plants belonging to allied genera, such as *Fraxinus* and *Ligustrum*, *Calluna* and *Erica*, *Urtica* and *Humulus*, *Silene maritima* and *Spergularia*. Oak has more species of Macrolepidoptera attached to it than any other plant; they are 18 in number and belong to several families, but the pedunculated and sessile oaks are now considered to be separate species, and I believe that both are eaten indiscriminately. The larvae feeding on oak must therefore be classed with those feeding on a genus and not one species of a genus. In the case of many larvae limited to a single species, it is the only representative of the genus found in this country, but on the continent where other members of the genus occur these also are eaten; for example *Bupalus piniaria* is confined to *Pinus sylvestris* in Britain, but eats other species of *Pinus* on the continent. Other examples of genera with only one native species are *Fagus* with one species of moth restricted to it; *Alnus* with two; *Clematis* with five; *Euphrasia* with two; *Eupatorium* with one; *Serratula* with one; *Solidago* with two; *Phragmites* with nine; *Elymus* with one; *Ammophila* with one. On the other hand *Ulmus campestris* has two

species peculiar to it and *Ulmus montana* has two others; *Carex glauca* has one; *Calamagrostis epigeios* has two; *Festuca arundinacea* has one; *Deschampsia caespitosa* has one; *Artemisia absynthium* has one, and *A. maritima* has two; *Lysimachia vulgaris* has one, and *Convolvulus arvensis* has three. In such cases the selection of one species of a genus is usually due to a difference in ecological conditions.

It is interesting that most of our moths with a very restricted range are not restricted because of the absence of a special food-plant. *Anepia irregularis*, however, has the same narrow range on the Breck sand as its food-plant, *Silene otites*, and it is probable that the limited south-western range of *Drepana harpagula* is coterminous with that of *Tilia parvifolia*.

Some of our Lepidoptera have reached the northern or western extremity of their distribution and have become limited to special ecological conditions or to a special food-plant. *Papilio machaon* is found only in the Fens and feeds chiefly on *Peucedanum palustre*, while abroad it is found in all kinds of country and feeds on many Umbellifers; *Malacosoma castrensis*, an inland and woodland species on the continent, is only found in the saltmarshes of south-eastern England, though it feeds on most of the plants which grow there. *Brachionycha nubeculosa*, which feeds on many kinds of tree abroad, only eats *Betula alba* in its local haunts in the Highlands of Scotland.

There are instances of biological races with different food-plants. *Eupithecia denotata* eats the seeds of *Campanula trachelium*, and its race *E. jasioneata* eats those of *Jasione montana*, while *Hydrelia flammeolaria* eats maple in the south and alder and mountain ash in Scotland. The distribution of the two plants might explain the former case, though it is not clear why other species of *Campanula* are avoided, but there is no obvious reason for the different food-plants of the *Hydrelia* in the south and in the north. *Plemyria bicolorata* eats rose, blackthorn, crab apple, birch, and alder in England, but in my experience it eats alder only in the north of Scotland.

3. **Captain Cyril Diver.**

Insects limited by the general conditions imposed by Plant communities.

The populations of a phytophagous species are seldom, if ever, coterminous with the populations of the plant species eaten, though the respective geographical distributions may be equally wide. Each insect species requires for its continued life the existence of a particular complex of conditions and can tolerate only a limited range of variation in these conditions—its " range of tolerance." The requirements and tolerance range of an organism like a plant cannot be expected to be the same as those of an insect; consequently, although a phytophagous insect cannot be present without the presence of a food-plant, populations of plants exist without the insects which in different conditions feed upon them. The limitations which control the development of an insect population are to a large extent imposed by the *structure* of the plant *communities* of which the plants eaten are component species. By " structure " is meant not merely the different plant species forming the community or their proportionate occurrence, but, for example, the way in which tall and short species are distributed within the community, or in the surrounding communities, the density of growth or clumping, and so on. These factors obviously have a marked effect upon microclimatic conditions, freedom of movement, provision of cover, etc. Similar conditions may be created by

different plant species if they are of similar habit; while different conditions may result from differences in habit of the same species (*e.g.* whether it is low or close cropped, or tall and luxuriant). These same limitations affect in precisely the same way the distribution of populations of insect species which are predacious or do not feed mainly on living plant tissues.

Increased knowledge in this field is fundamental to successful advances in the study of plant and animal populations, species distributions, colonisation, plagues, the control of pests, etc.

Examples will be given of the behaviour of certain British butterflies, moths (PHYCITIDAE and CRAMBIDAE), flies (SYRPHIDAE), grasshoppers, dragonflies, and ants.

4. **Dr. C. F. C. Beeson, C.I.E., M.A.**

The influence of insects on the regeneration, composition and destruction of forests.

Virgin forests are characterised by freedom from insect epidemics but catastrophes due to external factors may release destructive forces latent in endemic phytophagous insects. Seed insects are less important influences on the regeneration of forests than are insects feeding on the seedling and young sapling. The composition of a tree-community is determined largely in early youth but may be modified later by insects. " Pure forests are more liable to outbreaks of insect pests than are mixed forests " is an axiom of forestry. Virgin tree-associations, which are immune, are protected by components of the field stratum. Mixed forests derive immunity from complex interactions based on structural and floristic characters. The composition of a mixture from the aspect of crop-protection can be defined in terms of its primary and subsidiary insect-communities.

Tea will be served in the Library after the meeting.

NOTICES

ADMISSION OF FELLOWS

Any Fellow who has not been formally admitted to the Society under Chapter XIV, Section 4 of the Bye-Laws and attends the meeting on 1st December, 1943, is requested to inform the Registrar before 3.15 p.m. on that date.

THE GENERIC NAMES OF BRITISH INSECTS, prepared by the Committee on Generic Nomenclature of the Royal Entomological Society of London, with the assistance of the Department of Entomology of the British Museum (Natural History):

Part 1.	Recommendations relating to the publication of the committee's reports	price 6*d.*
Part 2.	The generic names of the British Rhopalocera with a check list of the species	price 3*s.* 6*d.*
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The next Meeting will be held on 1st December, 1943, **at 3.30 p.m.**

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